APCTP SEMINAR

Light-front wavefunctions of mesons by design

Meijian Li

University of Santiago de Compostela

July 26th (Tue.) 16:00

Online via ZOOM

We develop a mechanism to build the light-front wavefunctions (LFWFs) of meson bound states on a small-sized basis function representation. Unlike in a standard Hamiltonian formalism, the Hamiltonian in this method is implicit, and the information of the system is carried directly by the functional form and adjustable parameters of the LFWFs. In this work, we model the LFWFs for four charmonium states, η_c, J/ψ, ψ', and $\psi(3770)$ as superpositions of orthonormal basis functions. We choose the basis functions as eigenfunctions of an effective Hamiltonian, which has a longitudinal confining potential in addition to the transverse confining potential from light-front holographic QCD. We determine the basis function parameters and superposition coefficients by employing both guidance from the nonrelativistic description of the meson states and the experimental measurements of the meson decay widths. With the obtained wavefunctions, we study the features of those meson states, including charge radii and parton distribution functions. We use the J/ψ LFWF to calculate the meson production in diffractive deep inelastic scattering and ultra-peripheral heavy-ion collisions, and the η_c LFWF to calculate its diphoton transition form factor. Both results show good agreement with experiments. The obtained LFWFs have simple-functional forms and can be readily used to predict additional experimental observables.

Reference:
[1] M. Li, et al. arXiv:2111.07087

■ **ZOOM Webinar**

1) Please register through this ZOOM link (password is 0)
https://us06web.zoom.us/meeting/register/tZYtdO6orTssG9wK4H18Pc2B5Fmp3bUbuugJ
2) Join the webinar with a link generated after the registration
3) Please rename your profile - E.g. **Full name (affiliation)**

■ **Contact information**

- Host: Ahmad Jafar Arifi (ahmad.jafar.arifi@apctp.org)
- Office: Research Support Team (ra@apctp.org)

apctp

The APCTP is supported by the Korean Government through the Science and Technology Promotion Fund and Lottery Fund and strives to maximize social value through its various activities.
아시아태평양이론물리센터는 정부의 과학기술진흥기금 및 복권기금 지원으로 사회적 가치 제고에 힘쓰고 있습니다.